

## ABSTRACT

The present invention generally relates to semiconductor processing, and in particular to methods and systems for analyzing photolithographic reticle defects that include detecting soft defects on a reticle and analyzing the material composition of the defects for a particular chemical signature. Specifically, the present invention scans and images a soft defect *via* an optical inspection scan of a reticle, mills the defect using a Focused Ion Beam, and analyzes the defect for signatures using Electron Spectroscopy for Chemical Analysis and/or Fourier Transform Infrared Spectroscopy. The present invention thus provides for real-time analysis of the chemical composition of a soft defect on a reticle without the need for a defect identification navigation system. According to an aspect of the present invention, reticle defects can be monitored without removal of a pellicle, thus facilitating increased throughput and decreased cost in reticle repair and/or cleaning. According to another aspect of the invention, signatures occurring in trace amounts can be removed *via* employing a Focused Ion Beam in a non-reactive gas environment.